



COPY

SEQUENCE LISTING

<110> Willemssen, Petrus T.J.
Westerveen, Sjoukje F
Bakker, Douwe
van Zijderveld, Fred G
Thole, Jelle E.R.

<120> Paramycobacterial diagnostics and vaccines

<130> P54977US00

<140> US 10/501,127

<141> 2004-07-09

<150> PCT/NL03/00020

<151> 2003-01-13

<150> EP 02075089.9

<151> 2002-01-11

<160> 22

<170> PatentIn version 3.3

<210> 1

<211> 1175

<212> DNA

<213> Mycobacterium avium

<220>

<221> CDS

<222> (134)..(1144)

<400> 1
aattgcctca cgattcaata tcaccactct agtaatagga ttcccactcg taccatcgac 60

tgtgtgtgat tcctgccaga cagcatcggc ggggcgcgcc gacacaacac atagtcagat 120

agaggagact tcc gtg ccg aac cga cgc cga cgc aag ctt tcg aca gcc 169
Val Pro Asn Arg Arg Arg Arg Lys Leu Ser Thr Ala
1 5 10

atg agc gcg gtc gcc gcc ctg gca gtg gcg agt cct tgc gca tac ttc 217
Met Ser Ala Val Ala Ala Leu Ala Val Ala Ser Pro Cys Ala Tyr Phe
15 20 25

ctt gtc tac gaa tcg acg gcc ggc aac aag gcg ccc gag cac cac gag 265
Leu Val Tyr Glu Ser Thr Ala Gly Asn Lys Ala Pro Glu His His Glu
30 35 40

ttc aag cag gcc gca gtg atg agc gat ctg ccg ggc gag ctg atg ggt 313
Phe Lys Gln Ala Ala Val Met Ser Asp Leu Pro Gly Glu Leu Met Gly
45 50 55 60

gcg ctg tcg cag ggc ctg tcg cag ttt ggg atc aac ctg ccc ccg gtg 361
Ala Leu Ser Gln Gly Leu Ser Gln Phe Gly Ile Asn Leu Pro Pro Val
65 70 75

ccc gcc ctg agc ggc ggc gcc acc agc act ccc ggt ctg gcc agc ccc 409
Pro Ala Leu Ser Gly Gly Ala Thr Ser Thr Pro Gly Leu Ala Ser Pro
80 85 90

ggc ctg ggt agc ccc ggc ctg ggc acg ccc ggc ctg gga acg ccg ggc Gly Leu Gly Ser Pro Gly Leu Gly Thr Pro Gly Leu Gly Thr Pro Gly	457
ctg acc aat ccc ggt ctg acg agc ccc ggt gcg acc agt ccc ggc ctg Leu Thr Asn Pro Gly Leu Thr Ser Pro Gly Ala Thr Ser Pro Gly Leu	505
acc agt ccc ggc ctg acc agt cct ggt ttg acc agc ccc ggt ctg acc Thr Ser Pro Gly Leu Thr Ser Pro Gly Leu Thr Ser Pro Gly Leu Thr	553
agc ccg ggt gcg gcg ccg acg acg ccc ggc ctc acc gcg ccc ggc gcg Ser Pro Gly Ala Ala Pro Thr Thr Pro Gly Leu Thr Ala Pro Gly Ala	601
ctg ccg acc acg ccg ggc ggc ggc gtc gcc acc ccc ggc gcc ggc ctc Leu Pro Thr Thr Pro Gly Gly Gly Val Ala Thr Pro Gly Ala Gly Leu	649
aac ccc gcg ctg tcc aac ccc ggc ctg acc agc ccg gcc ggc acg gcg Asn Pro Ala Leu Ser Asn Pro Gly Leu Thr Ser Pro Ala Gly Thr Ala	697
ccg ggc ctg ggc agc ccg acc gtg gcg ccg agt gag gtg ccg atc gac Pro Gly Leu Gly Ser Pro Thr Val Ala Pro Ser Glu Val Pro Ile Asp	745
tcc ggc gcc ggc ctg gac ccg ggc gcc ggt ggc acg tac ccg atc ctg Ser Gly Ala Gly Leu Asp Pro Gly Ala Gly Thr Tyr Pro Ile Leu	793
ggc gac ccg tcg acc ttc ggt aac gcc tcg ccg atc ggc ggc ggt ggc Gly Asp Pro Ser Thr Phe Gly Asn Ala Ser Pro Ile Gly Gly Gly Gly	841
acc ggt ctg ggc ggc ggc tcg agc tcg ggt ggc agc ggc ggc ctg gtc Thr Gly Leu Gly Gly Gly Ser Ser Ser Gly Gly Ser Gly Gly Leu Val	889
aac gac gtg atg caa gcc gcc aac cag ctc ggc gcg ggt cag gcg atc Asn Asp Val Met Gln Ala Ala Asn Gln Leu Gly Ala Gly Gln Ala Ile	937
gac ctg ctc aag ggc ctg gtg atg ccg gcg atc acg cag ggc atg cac Asp Leu Leu Lys Gly Leu Val Met Pro Ala Ile Thr Gln Gly Met His	985
ggc ggc gcg gcc gcg ggt gct ttg ccc ggc gcg gcc ggt gct ctg ccc Gly Gly Ala Ala Ala Gly Ala Leu Pro Gly Ala Ala Gly Ala Leu Pro	1033
ggc gcg gcc ggc gcc ctg ccc ggt gcg gcc ggc gcc ctg ccg ggt gcg Gly Ala Ala Gly Ala Leu Pro Gly Ala Ala Gly Ala Leu Pro Gly Ala	1081
gcg ggc gcc gcg ggt gcg ttg ccg gcg gcc gcc ggc gcc gcg ccg gca Ala Gly Ala Ala Gly Ala Leu Pro Ala Ala Ala Gly Ala Ala Pro Ala	1129
ctg ccc ccg gtc tag accttttcca aaccatccac cagacggcac c Leu Pro Pro Val	1175

<210> 2
 <211> 336
 <212> PRT
 <213> Mycobacterium avium

<400> 2

Val Pro Asn Arg Arg Arg Arg Lys Leu Ser Thr Ala Met Ser Ala Val
 1 5 10 15

Ala Ala Leu Ala Val Ala Ser Pro Cys Ala Tyr Phe Leu Val Tyr Glu
 20 25 30

Ser Thr Ala Gly Asn Lys Ala Pro Glu His His Glu Phe Lys Gln Ala
 35 40 45

Ala Val Met Ser Asp Leu Pro Gly Glu Leu Met Gly Ala Leu Ser Gln
 50 55 60

Gly Leu Ser Gln Phe Gly Ile Asn Leu Pro Pro Val Pro Ala Leu Ser
 65 70 75 80

Gly Gly Ala Thr Ser Thr Pro Gly Leu Ala Ser Pro Gly Leu Gly Ser
 85 90 95

Pro Gly Leu Gly Thr Pro Gly Leu Gly Thr Pro Gly Leu Thr Asn Pro
 100 105 110

Gly Leu Thr Ser Pro Gly Ala Thr Ser Pro Gly Leu Thr Ser Pro Gly
 115 120 125

Leu Thr Ser Pro Gly Leu Thr Ser Pro Gly Leu Thr Ser Pro Gly Ala
 130 135 140

Ala Pro Thr Thr Pro Gly Leu Thr Ala Pro Gly Ala Leu Pro Thr Thr
 145 150 155 160

Pro Gly Gly Gly Val Ala Thr Pro Gly Ala Gly Leu Asn Pro Ala Leu
 165 170 175

Ser Asn Pro Gly Leu Thr Ser Pro Ala Gly Thr Ala Pro Gly Leu Gly
 180 185 190

Ser Pro Thr Val Ala Pro Ser Glu Val Pro Ile Asp Ser Gly Ala Gly
 195 200 205

Leu Asp Pro Gly Ala Gly Gly Thr Tyr Pro Ile Leu Gly Asp Pro Ser
 210 215 220

Thr Phe Gly Asn Ala Ser Pro Ile Gly Gly Gly Gly Thr Gly Leu Gly
 225 230 235 240

Gly Gly Ser Ser Ser Gly Gly Ser Gly Gly Leu Val Asn Asp Val Met
 245 250 255

Gln Ala Ala Asn Gln Leu Gly Ala Gly Gln Ala Ile Asp Leu Leu Lys
 260 265 270

Gly Leu Val Met Pro Ala Ile Thr Gln Gly Met His Gly Gly Ala Ala
 275 280 285

Ala Gly Ala Leu Pro Gly Ala Ala Gly Ala Leu Pro Gly Ala Ala Gly
 290 295 300

Ala Leu Pro Gly Ala Ala Gly Ala Leu Pro Gly Ala Ala Gly Ala Ala
 305 310 315 320

Gly Ala Leu Pro Ala Ala Ala Gly Ala Ala Pro Ala Leu Pro Pro Val
 325 330 335

<210> 3
 <211> 587
 <212> DNA
 <213> Mycobacterium avium

<220>
 <221> CDS
 <222> (67)..(567)

<400> 3
 ttcgagaagg gatagcaggc ggggccgggc ggtgaacccg ggaggcgcgcg ggtgcgtctt 60
 cagggc atg tcc cgt ttg tca ttt gtc tgc agg ctt ttg gcc gca acc 108
 Met Ser Arg Leu Ser Phe Val Cys Arg Leu Leu Ala Ala Thr
 1 5 10
 gct ttc gcc gtc gcc ctg cta ctc ggg ctg ggc gac gtg ccg cgc gcg 156
 Ala Phe Ala Val Ala Leu Leu Leu Gly Leu Gly Asp Val Pro Arg Ala
 15 20 25 30
 gcg gcc acc gac gac cgc ctg caa ttc acc gcg acc acg ctc agc ggc 204
 Ala Ala Thr Asp Asp Arg Leu Gln Phe Thr Ala Thr Thr Leu Ser Gly
 35 40 45
 gcg ccg ttc aac ggc gcc agt ctg cag ggc aag ccc gcc gtg ctg tgg 252
 Ala Pro Phe Asn Gly Ala Ser Leu Gln Gly Lys Pro Ala Val Leu Trp
 50 55 60
 ttc tgg acg ccg tgg tgc ccg tac tgc aac gcc gag gcc ccg ggc gtg 300
 Phe Trp Thr Pro Trp Cys Pro Tyr Cys Asn Ala Glu Ala Pro Gly Val
 65 70 75
 agc cgg gtg gcc gcc gcc aac ccg ggc gtc acc ttc gtc ggc gtc gcc 348
 Ser Arg Val Ala Ala Ala Asn Pro Gly Val Thr Phe Val Gly Val Ala
 80 85 90

gcc cac tcc gaa gtc ggc gcc atg gcc aac ttc gtc tcc aag tac aac 396
 Ala His Ser Glu Val Gly Ala Met Ala Asn Phe Val Ser Lys Tyr Asn 110
 95 100 105

ctg aac ttc acc acg ctc aac gac gcc gac ggc gcg atc tgg gcc cgc 444
 Leu Asn Phe Thr Thr Leu Asn Asp Ala Asp Gly Ala Ile Trp Ala Arg 125
 115 120

tac ggc gtg ccc tgg cag ccc gcg tac gtg ttc tac cgg gcg gac ggc 492
 Tyr Gly Val Pro Trp Gln Pro Ala Tyr Val Phe Tyr Arg Ala Asp Gly 140
 130 135

agc tcc acc ttc gtc aac aac ccc acc tcg gcg atg ccc cag gac gaa 540
 Ser Ser Thr Phe Val Asn Asn Pro Thr Ser Ala Met Pro Gln Asp Glu 155
 145 150

ctg gcc gcc cgg gtg gcg gcg ctg cgc tgacgtggac cgcggtctgg 587
 Leu Ala Ala Arg Val Ala Ala Leu Arg 165
 160

<210> 4
 <211> 167
 <212> PRT
 <213> Mycobacterium avium

<400> 4

Met Ser Arg Leu Ser Phe Val Cys Arg Leu Leu Ala Ala Thr Ala Phe
 1 5 10 15

Ala Val Ala Leu Leu Leu Gly Leu Gly Asp Val Pro Arg Ala Ala Ala
 20 25 30

Thr Asp Asp Arg Leu Gln Phe Thr Ala Thr Thr Leu Ser Gly Ala Pro
 35 40 45

Phe Asn Gly Ala Ser Leu Gln Gly Lys Pro Ala Val Leu Trp Phe Trp
 50 55 60

Thr Pro Trp Cys Pro Tyr Cys Asn Ala Glu Ala Pro Gly Val Ser Arg
 65 70 75 80

Val Ala Ala Ala Asn Pro Gly Val Thr Phe Val Gly Val Ala Ala His
 85 90 95

Ser Glu Val Gly Ala Met Ala Asn Phe Val Ser Lys Tyr Asn Leu Asn
 100 105 110

Phe Thr Thr Leu Asn Asp Ala Asp Gly Ala Ile Trp Ala Arg Tyr Gly
 115 120 125

Val Pro Trp Gln Pro Ala Tyr Val Phe Tyr Arg Ala Asp Gly Ser Ser
 130 135 140

Thr Phe Val Asn Asn Pro Thr Ser Ala Met Pro Gln Asp Glu Leu Ala
145 150 155 160

Ala Arg Val Ala Ala Leu Arg
165

<210> 5
<211> 366
<212> DNA
<213> Mycobacterium avium

<220>
<221> CDS
<222> (34)..(366)

<400> 5
tagcgggtgca ttgactgggg aaggtgtcca cac atg agg ctg tcg ttg agc aaa 54
Met Arg Leu Ser Leu Ser Lys
1 5

ttg ggc gtt gcg gtg ggc agc gcg gca gtg gca ttg acc gcc gcg gcc 102
Leu Gly Val Ala Val Gly Ser Ala Ala Val Ala Leu Thr Ala Ala Ala
10 15 20

ggt gtc gca tcc gcc gac ccc atg gac gcg atc atc aac acc acc tgc 150
Gly Val Ala Ser Ala Asp Pro Met Asp Ala Ile Ile Asn Thr Thr Cys
25 30 35

aac tac ggg cag gtg atc gcc gcg ctg aac gcg tcc gac ccg gcg gct 198
Asn Tyr Gly Gln Val Ile Ala Ala Leu Asn Ala Ser Asp Pro Ala Ala
40 45 50 55

gcc cag cag ctg aac tcg tcg ccg atg gcg cag tcc tac atc cag cgg 246
Ala Gln Gln Leu Asn Ser Ser Pro Met Ala Gln Ser Tyr Ile Gln Arg
60 65 70

ttc ctg gcc tcc ccg ccg gcg aag cgt cag cag atg gcc cag cag atc 294
Phe Leu Ala Ser Pro Pro Ala Lys Arg Gln Gln Met Ala Gln Gln Ile
75 80 85

cag ggc atg ccg gcc gcg cag cag tac atc aac gac atc aac cag gtc 342
Gln Gly Met Pro Ala Ala Gln Gln Tyr Ile Asn Asp Ile Asn Gln Val
90 95 100

gcg gtc acc tgt aac aac ttc tga 366
Ala Val Thr Cys Asn Asn Phe
105 110

<210> 6
<211> 110
<212> PRT
<213> Mycobacterium avium

<400> 6

Met Arg Leu Ser Leu Ser Lys Leu Gly Val Ala Val Gly Ser Ala Ala
1 5 10 15

Val Ala Leu Thr Ala Ala Ala Gly Val Ala Ser Ala Asp Pro Met Asp
 20 25 30

Ala Ile Ile Asn Thr Thr Cys Asn Tyr Gly Gln Val Ile Ala Ala Leu
 35 40 45

Asn Ala Ser Asp Pro Ala Ala Ala Gln Gln Leu Asn Ser Ser Pro Met
 50 55 60

Ala Gln Ser Tyr Ile Gln Arg Phe Leu Ala Ser Pro Pro Ala Lys Arg
 65 70 75 80

Gln Gln Met Ala Gln Gln Ile Gln Gly Met Pro Ala Ala Gln Gln Tyr
 85 90 95

Ile Asn Asp Ile Asn Gln Val Ala Val Thr Cys Asn Asn Phe
 100 105 110

<210> 7
 <211> 1410
 <212> DNA
 <213> Mycobacterium avium

<220>
 <221> CDS
 <222> (46)..(1410)

<400> 7
 ctataggcat accccgacgc agaaacaaca cggaaggtag ctccg gtg gct ccg aag 57
 Val Ala Pro Lys
 1

gtc tcg tcc gat ctg ttc tcg cag att gtc aat tcc ggt cct gga tcg 105
 Val Ser Ser Asp Leu Phe Ser Gln Ile Val Asn Ser Gly Pro Gly Ser
 5 10 15 20

ttt ctc gcc aag cag ctc ggc gtc ccg caa ccc gag acg ctg cgc cgc 153
 Phe Leu Ala Lys Gln Leu Gly Val Pro Gln Pro Glu Thr Leu Arg Arg
 25 30 35

tac cgg ccc ggt gac ccg ccg ctg gcc ggg tcg ctg ctg atc ggc ggc 201
 Tyr Arg Pro Gly Asp Pro Pro Leu Ala Gly Ser Leu Leu Ile Gly Gly
 40 45 50

gag ggc cgc gtg gtc gag ccg ctg cgg gcg gcg ctg gcc aag gac tac 249
 Glu Gly Arg Val Val Glu Pro Leu Arg Ala Ala Leu Ala Lys Asp Tyr
 55 60 65

gac ctg gtc ggc aac aac ctg ggc ggg cgc tgg gcc gac cgg ttc ggc 297
 Asp Leu Val Gly Asn Asn Leu Gly Gly Arg Trp Ala Asp Arg Phe Gly
 70 75 80

ggg ctg gtc ttc gac gcc acc ggg atc acc acc ccg gag ggc ctg aag 345
 Gly Leu Val Phe Asp Ala Thr Gly Ile Thr Thr Pro Glu Gly Leu Lys
 85 90 95 100

ggg ctg tac gag ttc ttc acc cca ctg ctg cgc aac ctg ggt cac tgc 393
 7

Gly	Leu	Tyr	Glu	Phe 105	Phe	Thr	Pro	Leu	Leu 110	Arg	Asn	Leu	Gly	His 115	Cys	
gcc Ala	cgc Arg	gtg Val	gtg Val	gtg Val	gtc Val	ggc Gly	acc Thr	acg Thr	ccc Pro	gac Asp	gcc Ala	gcc Ala	gcc Ala	ggc Gly	ccg Pro	441
cac His	gag Glu	cgc Arg	atc Ile	gcc Ala	cag Gln	cgc Arg	gcc Ala	ctg Leu	gag Glu	ggc Gly	ttc Phe	acc Thr	cgg Arg	tca Ser	ttg Leu	489
ggc Gly	aag Lys	gag Glu	ctg Leu	cgc Arg	aac Asn	ggc Gly	tcg Ser	acg Thr	gtg Val	gcg Ala	ctg Leu	gtg Val	tac Tyr	ctg Leu	tcg Ser	537
ccg Pro	gcc Ala	gcc Ala	aaa Lys	ccc Pro	gcc Ala	gcg Ala	acg Thr	ggc Gly	ctg Leu	gag Glu	tcg Ser	acc Thr	atg Met	cgg Arg	ttc Phe	585
atc Ile	ctg Leu	tcg Ser	gcc Ala	aag Lys	tcc Ser	gcc Ala	tac Tyr	gtc Val	gac Asp	ggc Gly	cag Gln	gtc Val	ttc Phe	tac Tyr	gtc Val	633
ggc Gly	gag Glu	gcc Ala	gac Asp	tcc Ser	acc Thr	ccc Pro	ccg Pro	gcg Ala	gac Asp	tgg Trp	gaa Glu	cgg Arg	ccg Pro	ctg Leu	gac Asp	681
ggc Gly	aag Lys	gtc Val	gcc Ala	atc Ile	gtg Val	acc Thr	ggt Gly	gcg Ala	gcc Ala	cgc Arg	gga Gly	atc Ile	ggc Gly	gcc Ala	acg Thr	729
atc Ile	gcc Ala	gag Glu	gtg Val	ttc Phe	gcc Ala	cgc Arg	gac Asp	ggc Gly	gcc Ala	cgc Arg	gtg Val	gtc Val	gcg Ala	atc Ile	gac Asp	777
gtg Val	gaa Glu	tcg Ser	gcc Ala	gcc Ala	gag Glu	acg Thr	ctg Leu	gcc Ala	gag Glu	acg Thr	gcc Ala	agc Ser	cgg Arg	gtc Val	ggc Gly	825
ggc Gly	acc Thr	gcg Ala	ctg Leu	tgg Trp	ctc Leu	gac Asp	gtc Val	acc Thr	gcc Ala	ccc Pro	gac Asp	gcc Ala	gtc Val	gac Asp	aag Lys	873
atc Ile	acc Thr	gag Glu	cac His	ctg Leu	cgc Arg	gag Glu	cac His	cac His	ggc Gly	ggt Gly	cac His	gcc Ala	gac Asp	atc Ile	ctg Leu	921
gtc Val	aac Asn	aac Asn	gcc Ala	ggg Gly	atc Ile	acc Thr	cgc Arg	gac Asp	aag Lys	ctg Leu	ctg Leu	gcc Ala	aac Asn	atg Met	gac Asp	969
gac Asp	gcg Ala	cgc Arg	tgg Trp	gac Asp	gcc Ala	gtg Val	ttg Leu	gcc Ala	gtg Val	aat Asn	ctg Leu	ctt Leu	gcc Ala	cca Pro	ctt Leu	1017
cgc Arg	ctt Leu	acc Thr	gaa Glu	ggg Gly	ctg Leu	gtg Val	ggc Gly	aac Asn	ggc Gly	agc Ser	atc Ile	ggc Gly	gaa Glu	ggc Gly	ggc Gly	1065
cgc Arg	atc Ile	gtc Val	ggc Gly	ctt Leu	tcg Ser	tcg Ser	atg Met	gcc Ala	ggc Gly	atc Ile	gcg Ala	ggc Gly	aac Asn	cgc Arg	ggc Gly	1113
cag	acc	aac	tac	gcc	acc	acc	aag	gca	ggc	atg	atc	ggc	ctc	acc	cag	1161

Gln	Thr	Asn	Tyr	Ala	Thr	Thr	Lys	Ala	Gly	Met	Ile	Gly	Leu	Thr	Gln		
			360					365					370				
gcg	ctg	gcg	ccg	gag	ctc	tac	gac	aag	ggc	atc	acc	atc	aac	gcc	gtc		1209
Ala	Leu	Ala	Pro	Glu	Leu	Tyr	Asp	Lys	Gly	Ile	Thr	Ile	Asn	Ala	Val		
		375					380					385					
gcg	ccg	gga	ttc	atc	gag	acc	cag	atg	acg	gcc	gcc	atc	ccg	ctg	gcc		1257
Ala	Pro	Gly	Phe	Ile	Glu	Thr	Gln	Met	Thr	Ala	Ala	Ile	Pro	Leu	Ala		
	390					395				400							
acc	cg	gag	gtg	ggg	cg	cg	atg	aac	tcg	ctg	ctg	cag	ggc	ggg	cag		1305
Thr	Arg	Glu	Val	Gly	Arg	Arg	Met	Asn	Ser	Leu	Leu	Gln	Gly	Gly	Gln		
405				410						415					420		
ccg	gtg	gac	gtc	gcc	gaa	acc	atc	gcc	tac	ttc	gcc	agc	ccg	gcg	tcg		1353
Pro	Val	Asp	Val	Ala	Glu	Thr	Ile	Ala	Tyr	Phe	Ala	Ser	Pro	Ala	Ser		
				425				430						435			
aac	gcg	gtg	acc	ggc	aac	gtc	atc	cg	gtc	tgc	ggc	cag	gcg	atg	ctg		1401
Asn	Ala	Val	Thr	Gly	Asn	Val	Ile	Arg	Val	Cys	Gly	Gln	Ala	Met	Leu		
			440					445					450				
ggg	gca	tga															1410
Gly	Ala																

<210> 8
 <211> 454
 <212> PRT
 <213> Mycobacterium avium

<400> 8

Val	Ala	Pro	Lys	Val	Ser	Ser	Asp	Leu	Phe	Ser	Gln	Ile	Val	Asn	Ser	
1				5					10					15		

Gly	Pro	Gly	Ser	Phe	Leu	Ala	Lys	Gln	Leu	Gly	Val	Pro	Gln	Pro	Glu	
			20					25					30			

Thr	Leu	Arg	Arg	Tyr	Arg	Pro	Gly	Asp	Pro	Pro	Leu	Ala	Gly	Ser	Leu	
		35					40					45				

Leu	Ile	Gly	Gly	Glu	Gly	Arg	Val	Val	Glu	Pro	Leu	Arg	Ala	Ala	Leu	
	50					55					60					

Ala	Lys	Asp	Tyr	Asp	Leu	Val	Gly	Asn	Asn	Leu	Gly	Gly	Arg	Trp	Ala	
65					70					75					80	

Asp	Arg	Phe	Gly	Gly	Leu	Val	Phe	Asp	Ala	Thr	Gly	Ile	Thr	Thr	Pro	
			85						90					95		

Glu	Gly	Leu	Lys	Gly	Leu	Tyr	Glu	Phe	Phe	Thr	Pro	Leu	Leu	Arg	Asn	
			100					105					110			

Leu	Gly	His	Cys	Ala	Arg	Val	Val	Val	Val	Gly	Thr	Thr	Pro	Asp	Ala	
										9						

115

120

125

Ala Ala Gly Pro His Glu Arg Ile Ala Gln Arg Ala Leu Glu Gly Phe
 130 135 140

Thr Arg Ser Leu Gly Lys Glu Leu Arg Asn Gly Ser Thr Val Ala Leu
 145 150 155 160

Val Tyr Leu Ser Pro Ala Ala Lys Pro Ala Ala Thr Gly Leu Glu Ser
 165 170 175

Thr Met Arg Phe Ile Leu Ser Ala Lys Ser Ala Tyr Val Asp Gly Gln
 180 185 190

Val Phe Tyr Val Gly Glu Ala Asp Ser Thr Pro Pro Ala Asp Trp Glu
 195 200 205

Arg Pro Leu Asp Gly Lys Val Ala Ile Val Thr Gly Ala Ala Arg Gly
 210 215 220

Ile Gly Ala Thr Ile Ala Glu Val Phe Ala Arg Asp Gly Ala Arg Val
 225 230 235 240

Val Ala Ile Asp Val Glu Ser Ala Ala Glu Thr Leu Ala Glu Thr Ala
 245 250 255

Ser Arg Val Gly Gly Thr Ala Leu Trp Leu Asp Val Thr Ala Pro Asp
 260 265 270

Ala Val Asp Lys Ile Thr Glu His Leu Arg Glu His His Gly Gly His
 275 280 285

Ala Asp Ile Leu Val Asn Asn Ala Gly Ile Thr Arg Asp Lys Leu Leu
 290 295 300

Ala Asn Met Asp Asp Ala Arg Trp Asp Ala Val Leu Ala Val Asn Leu
 305 310 315 320

Leu Ala Pro Leu Arg Leu Thr Glu Gly Leu Val Gly Asn Gly Ser Ile
 325 330 335

Gly Glu Gly Gly Arg Ile Val Gly Leu Ser Ser Met Ala Gly Ile Ala
 340 345 350

Gly Asn Arg Gly Gln Thr Asn Tyr Ala Thr Thr Lys Ala Gly Met Ile
 355 360 365

Gly Leu Thr Gln Ala Leu Ala Pro Glu Leu Tyr Asp Lys Gly Ile Thr
 10

370

375

380

Ile Asn Ala Val Ala Pro Gly Phe Ile Glu Thr Gln Met Thr Ala Ala
385 390 395 400

Ile Pro Leu Ala Thr Arg Glu Val Gly Arg Arg Met Asn Ser Leu Leu
405 410 415

Gln Gly Gly Gln Pro Val Asp Val Ala Glu Thr Ile Ala Tyr Phe Ala
420 425 430

Ser Pro Ala Ser Asn Ala Val Thr Gly Asn Val Ile Arg Val Cys Gly
435 440 445

Gln Ala Met Leu Gly Ala
450

<210> 9
<211> 625
<212> DNA
<213> Mycobacterium avium

<220>
<221> CDS
<222> (179)..(625)

<220>
<221> misc_feature
<222> (592)..(592)
<223> n is a, c, g, or t

<220>
<221> misc_feature
<222> (619)..(619)
<223> n is a, c, g, or t

<400> 9
aattcgcgca taccgcgtcac tggtcacaac gccacatgct ggtaggctgt ggaatcgagg 60
gtcaatccgg atcggacccc aacgtcgact tgtgggcgcc aattcgcggg ttttcgcccc 120
gcaagtcgac gttcggcgcg aatcgggtgag gtgggcacag gtgaatgacg aagaggac 178
atg ctg gtc gcc acg gtg cgg gcg ttc atc gac cgc gag gtc aaa ccg 226
Met Leu Val Ala Thr Val Arg Ala Phe Ile Asp Arg Glu Val Lys Pro
1 5 10 15
acc gtg cgc gag gtg gag cac gcc gat gcc tat ccc gag gcg tgg atc 274
Thr Val Arg Glu Val Glu His Ala Asp Ala Tyr Pro Glu Ala Trp Ile
20 25 30
gag cag atg aag cgg atc ggg atc tac ggg ctg gcg gtg ccc gag gaa 322
Glu Gln Met Lys Arg Ile Gly Ile Tyr Gly Leu Ala Val Pro Glu Glu
35 40 45
tac ggt ggt tcg ccg gtg tcc atg ccg tgc tac gtg cgg gtc acc gag 370
Tyr Gly Gly Ser Pro Val Ser Met Pro Cys Tyr Val Arg Val Thr Glu
11

50	55	60	
cag ctg gcg cgc ggc tgg atg agc ctg gcc ggg gcg atg ggc ggg cac Gln Leu Ala Arg Gly Trp Met Ser Leu Ala Gly Ala Met Gly Gly His 65 70 75 80			418
acc gtg gtg gcc aag ctg cta acg ctg ttc ggc acc gag gac cas aag Thr Val Val Ala Lys Leu Leu Thr Leu Phe Gly Thr Glu Asp Xaa Lys 85 90 95			466
cgg gcc tac ctg ccg cgg atg gcc agc ggc gaa atc cgg gcc acc atg Arg Ala Tyr Leu Pro Arg Met Ala Ser Gly Glu Ile Arg Ala Thr Met 100 105 110			514
gcg ttg acc gag ccc sgc ggc ggc tcg gac ctg cag aac atg tcg acc Ala Leu Thr Glu Pro Xaa Gly Gly Ser Asp Leu Gln Asn Met Ser Thr 115 120 125			562
acc gcg ctg ccc gac ccc gac tcc gac ggn ctg gtg gtc aac ggg gcc Thr Ala Leu Pro Asp Pro Asp Ser Asp Gly Leu Val Val Asn Gly Ala 130 135 140			610
aag acc tgn atc aac Lys Thr Xaa Ile Asn 145			625

<210> 10
 <211> 149
 <212> PRT
 <213> Mycobacterium avium

<220>
 <221> misc_feature
 <222> (95)..(95)
 <223> The 'xaa' at location 95 stands for Gln, or His.

<220>
 <221> misc_feature
 <222> (118)..(118)
 <223> The 'xaa' at location 118 stands for Gly, or Arg.

<220>
 <221> misc_feature
 <222> (147)..(147)
 <223> The 'xaa' at location 147 stands for Trp, or Cys.

<400> 10

Met Leu Val Ala Thr Val Arg Ala Phe Ile Asp Arg Glu Val Lys Pro
 1 5 10 15

Thr Val Arg Glu Val Glu His Ala Asp Ala Tyr Pro Glu Ala Trp Ile
 20 25 30

Glu Gln Met Lys Arg Ile Gly Ile Tyr Gly Leu Ala Val Pro Glu Glu
 35 40 45

Tyr Gly Gly Ser Pro Val Ser Met Pro Cys Tyr Val Arg Val Thr Glu
 50 55 60

Gln Leu Ala Arg Gly Trp Met Ser Leu Ala Gly Ala Met Gly Gly His
65 70 75 80

Thr Val Val Ala Lys Leu Leu Thr Leu Phe Gly Thr Glu Asp Xaa Lys
85 90 95

Arg Ala Tyr Leu Pro Arg Met Ala Ser Gly Glu Ile Arg Ala Thr Met
100 105 110

Ala Leu Thr Glu Pro Xaa Gly Gly Ser Asp Leu Gln Asn Met Ser Thr
115 120 125

Thr Ala Leu Pro Asp Pro Asp Ser Asp Gly Leu Val Val Asn Gly Ala
130 135 140

Lys Thr Xaa Ile Asn
145

<210> 11
<211> 241
<212> DNA
<213> Mycobacterium avium

<220>
<221> CDS
<222> (147)..(239)

<400> 11
gtgggggcaa gcccaattacg ttcgcatcga cccggcacag gcggtcgctc acgtcatcaa 60

catgccgctc atccccgatg aggctcgaat gaccttgcta cgcaggcgct gaacgcacga 120

cgaaacggac cggaggtgaa agggac atg agc cac gcc gat caa ctc gct cgg 173
Met Ser His Ala Asp Gln Leu Ala Arg
1 5

acg cac ctg gcg ccc gat cct gcg gac ctg tcg cgc ctg gtc gcc ggc 221
Thr His Leu Ala Pro Asp Pro Ala Asp Leu Ser Arg Leu Val Ala Gly
10 15 20 25

acc cac cac gac ccg cac gg 241
Thr His His Asp Pro His
30

<210> 12
<211> 31
<212> PRT
<213> Mycobacterium avium

<400> 12

Met Ser His Ala Asp Gln Leu Ala Arg Thr His Leu Ala Pro Asp Pro
1 5 10 15

Ala Asp Leu Ser Arg Leu Val Ala Gly Thr His His Asp Pro His
 20 25 30

<210> 13
 <211> 236
 <212> DNA
 <213> Mycobacterium avium

<220>
 <221> CDS
 <222> (8)..(214)

<400> 13
 ggacacc aac gtg acc ggg gtg ttt ctc acc gcc cag gcg gcg gcc cgg 49
 Asn Val Thr Gly Val Phe Leu Thr Ala Gln Ala Ala Ala Arg
 1 5 10
 gcg atg atg cgg cag ggc cgc ggc ggc gcc atc atc acc acc gcc tcg 97
 Ala Met Met Arg Gln Gly Arg Gly Gly Ala Ile Ile Thr Thr Ala Ser
 15 20 25 30
 atg tcc ggg cac atc atc aac gtc ccg cag cag gtc ggc cac tac tgc 145
 Met Ser Gly His Ile Ile Asn Val Pro Gln Val Gly His Tyr Cys
 35 40 45
 gcc agc aag gcg gcc gtg atc cag ctg acc aag gcc atg gcc gtc gaa 193
 Ala Ser Lys Ala Ala Val Ile Gln Leu Thr Lys Ala Met Ala Val Glu
 50 55 60
 ttc tgc agg atc cgt cga ctc tagactcgag caagcttatg ca 236
 Phe Cys Arg Ile Arg Arg Leu
 65

<210> 14
 <211> 69
 <212> PRT
 <213> Mycobacterium avium

<400> 14
 Asn Val Thr Gly Val Phe Leu Thr Ala Gln Ala Ala Ala Arg Ala Met
 1 5 10 15
 Met Arg Gln Gly Arg Gly Gly Ala Ile Ile Thr Thr Ala Ser Met Ser
 20 25 30
 Gly His Ile Ile Asn Val Pro Gln Gln Val Gly His Tyr Cys Ala Ser
 35 40 45
 Lys Ala Ala Val Ile Gln Leu Thr Lys Ala Met Ala Val Glu Phe Cys
 50 55 60
 Arg Ile Arg Arg Leu
 65

<210> 15

<222> (103)..(103)
 <223> The 'Xaa' at location 103 stands for Met, Val, or Leu.

<220>
 <221> misc_feature
 <222> (125)..(125)
 <223> The 'Xaa' at location 125 stands for Lys, Arg, Thr, or Met.

<400> 16

Met Thr His Thr Lys Ala Gly Arg Ala Ala Trp Pro Ala Ala Cys Ala
 1 5 10 15

Val Val Leu Ser Ala Ala Ala Leu Leu Cys Ala Ala Ala Ala Ala Ala
 20 25 30

Asp Glu Ala Asp Asp Ala Phe Leu Ala Gly Leu Ala Lys Gly Gly Ile
 35 40 45

Thr Met Phe Asp Asp Asp Asp Ala Ile Ala Met Gly His Ser Val Cys
 50 55 60

Ser Ser Ile Asp Ala Asn Pro Asn Val Ser Met Leu Ala Leu Arg Leu
 65 70 75 80

Thr Lys Gln Thr Pro Leu Thr Pro Lys Gln Ser Gly Tyr Phe Ile Gly
 85 90 95

Leu Ser Val Ala Ser Tyr Xaa Pro Ala Val Gln Gly Arg Arg Arg Pro
 100 105 110

Leu Ala Gly Leu Ala Asp Pro Ala Ala Ala Asp Val Xaa Leu Pro Ala
 115 120 125

Gly Ile Gly
 130

<210> 17
 <211> 392
 <212> DNA
 <213> Mycobacterium avium

<220>
 <223> Paratuberculosis protein gene

<220>
 <221> CDS
 <222> (94)..(390)

<400> 17
 cggcgtagca tcgtcaagtc gttgcccgcg ctgatgccgg agcggcagta aggagttcgg 60
 ctggtgcaaa aacgcttgcc cacagtcggt ttg gtg ctg acg gcc gtt gtc gcc 114
 Val Leu Thr Ala Val Val Ala
 16

1										5										
ggt	atc	gcc	ggg	tgc	agc	gcg	gcg	cag	acc	gtg	ccg	cgc	aag	gcc	gcc	162				
Gly	Ile	Ala	Gly	Cys	Ser	Ala	Ala	Gln	Thr	Val	Pro	Arg	Lys	Ala	Ala					
		10					15					20								
cgg	ctg	acc	atc	gac	ggt	gcc	acc	cac	acg	acc	cgc	ccg	ccg	tcc	tgc	210				
Arg	Leu	Thr	Ile	Asp	Gly	Ala	Thr	His	Thr	Thr	Arg	Pro	Pro	Ser	Cys					
	25				30						35									
cgg	cag	gac	cag	atg	tat	cgg	acc	atc	aac	atc	ccc	gac	cac	gac	ggt	258				
Arg	Gln	Asp	Gln	Met	Tyr	Arg	Thr	Ile	Asn	Ile	Pro	Asp	His	Asp	Gly					
40					45					50					55					
gga	gtc	gaa	gcg	gtg	gtg	ctg	ctc	agc	ggt	tac	cgg	gtg	atg	ccg	cag	306				
Gly	Val	Glu	Ala	Val	Val	Leu	Leu	Ser	Gly	Tyr	Arg	Val	Met	Pro	Gln					
				60					65					70						
tgg	gtg	aag	atc	cgg	aac	gtc	gac	ggc	ttc	acc	ggc	agt	cta	ctg	gcc	354				
Trp	Val	Lys	Ile	Arg	Asn	Val	Asp	Gly	Phe	Thr	Gly	Ser	Leu	Leu	Ala					
			75					80					85							
asg	gcg	gag	tgg	gcg	acg	cgc	acg	tcg	atc	tca	cma	at				392				
Xaa	Ala	Glu	Trp	Ala	Thr	Arg	Thr	Ser	Ile	Ser	Xaa									
		90					95													

<210> 18
 <211> 99
 <212> PRT
 <213> Mycobacterium avium

<220>
 <221> misc_feature
 <222> (88)..(88)
 <223> The 'Xaa' at location 88 stands for Arg, or Thr.

<220>
 <221> misc_feature
 <222> (99)..(99)
 <223> The 'Xaa' at location 99 stands for Gln, or Pro.

<400> 18

Val	Leu	Thr	Ala	Val	Val	Ala	Gly	Ile	Ala	Gly	Cys	Ser	Ala	Ala	Gln	
1				5				10						15		
Thr	Val	Pro	Arg	Lys	Ala	Ala	Arg	Leu	Thr	Ile	Asp	Gly	Ala	Thr	His	
			20					25					30			
Thr	Thr	Arg	Pro	Pro	Ser	Cys	Arg	Gln	Asp	Gln	Met	Tyr	Arg	Thr	Ile	
		35					40					45				
Asn	Ile	Pro	Asp	His	Asp	Gly	Gly	Val	Glu	Ala	Val	Val	Leu	Leu	Ser	
	50					55					60					
Gly	Tyr	Arg	Val	Met	Pro	Gln	Trp	Val	Lys	Ile	Arg	Asn	Val	Asp	Gly	
65					70					75					80	

Phe Thr Gly Ser Leu Leu Ala Xaa Ala Glu Trp Ala Thr Arg Thr Ser
85 90 95

Ile Ser Xaa

<210> 19
<211> 1884
<212> DNA
<213> Mycobacterium avium

<220>
<221> CDS
<222> (13)..(1884)

<400> 19
taaccaggag ca atg gct cgt gcg gtc ggt atc gac ctc ggg acc acc aac 51
Met Ala Arg Ala Val Gly Ile Asp Leu Gly Thr Thr Asn
1 5 10

tcc gtc gtc gca gtc ctc gag ggc ggt gac ccc gtc gtc gtc gcc aac 99
Ser Val Val Ala Val Leu Glu Gly Gly Asp Pro Val Val Val Ala Asn
15 20 25

tcc gag ggc tcg cgg acc acc ccg tcc atc gtc gcg ttc gcc cgc aac 147
Ser Glu Gly Ser Arg Thr Thr Pro Ser Ile Val Ala Phe Ala Arg Asn
30 35 40 45

ggc gag gtg ctc gtc ggc cag ccc gcc aag aac cag gcg gtg acc aac 195
Gly Glu Val Leu Val Gly Gln Pro Ala Lys Asn Gln Ala Val Thr Asn
50 55 60

gtc gac cgc acc atc cgt tcg gtc aag cgg cac atg ggc acc gac tgg 243
Val Asp Arg Thr Ile Arg Ser Val Lys Arg His Met Gly Thr Asp Trp
65 70 75

tcc atc gag atc gac ggc aag aaa tac acc gct cag gag atc agc gcc 291
Ser Ile Glu Ile Asp Gly Lys Lys Tyr Thr Ala Gln Glu Ile Ser Ala
80 85 90

cgc gtg ctg atg aag ctc aag cgc gac gcc gag gcc tat ctg ggt gag 339
Arg Val Leu Met Lys Leu Lys Arg Asp Ala Glu Ala Tyr Leu Gly Glu
95 100 105

gac atc acc gac gcg gtc atc acc gta ccg gcg tac ttc aac gac gcc 387
Asp Ile Thr Asp Ala Val Ile Thr Val Pro Ala Tyr Phe Asn Asp Ala
110 115 120 125

cag cgt cag gcg acc aag gaa gcc ggc cag atc gcc ggc ctc aac gtg 435
Gln Arg Gln Ala Thr Lys Glu Ala Gly Gln Ile Ala Gly Leu Asn Val
130 135 140

ctg cgc atc gtc aac gag ccg acc gcg gcc gcg ctg gcc tac ggc ctg 483
Leu Arg Ile Val Asn Glu Pro Thr Ala Ala Ala Leu Ala Tyr Gly Leu
145 150 155

gac aag ggc gag aag gag cag acc atc ctg gtc ttc gac ctc ggc ggc 531
Asp Lys Gly Glu Lys Glu Gln Thr Ile Leu Val Phe Asp Leu Gly Gly
160 165 170

ggc acg ttc gac gtt tcg ctg ctc gag atc ggc gag ggt gtg gtc gag 579
18

Gly	Thr	Phe	Asp	Val	Ser	Leu	Leu	Glu	Ile	Gly	Glu	Gly	Val	Val	Glu	
175						180					185					
gtc	cgc	gcc	acc	agc	ggc	gac	aac	caa	ctc	ggc	ggc	gac	gac	tgg	gac	627
Val	Arg	Ala	Thr	Ser	Gly	Asp	Asn	Gln	Leu	Gly	Gly	Asp	Asp	Trp	Asp	
190					195					200					205	
gac	cgg	atc	gtc	aac	tgg	ctg	gtc	gac	aag	ttc	aag	ggc	acc	agc	ggc	675
Asp	Arg	Ile	Val	Asn	Trp	Leu	Val	Asp	Lys	Phe	Lys	Gly	Thr	Ser	Gly	
				210					215					220		
atc	gac	ctg	acc	aag	gac	aag	atg	gcc	atg	cag	cgg	ctg	cgt	gag	gcc	723
Ile	Asp	Leu	Thr	Lys	Asp	Lys	Met	Ala	Met	Gln	Arg	Leu	Arg	Glu	Ala	
			225					230					235			
gcc	gag	aag	gcc	aag	atc	gag	ttg	tcc	agc	tcg	cag	agc	acc	tcg	atc	771
Ala	Glu	Lys	Ala	Lys	Ile	Glu	Leu	Ser	Ser	Ser	Gln	Ser	Thr	Ser	Ile	
		240					245					250				
aac	ctg	ccc	tac	atc	acc	gtc	gac	gcg	gac	aag	aac	ccg	ctg	ttc	ctc	819
Asn	Leu	Pro	Tyr	Ile	Thr	Val	Asp	Ala	Asp	Lys	Asn	Pro	Leu	Phe	Leu	
		255				260					265					
gac	gag	cag	ctg	acc	cgc	gcc	gaa	ttc	cag	cgc	atc	acc	cag	gat	ctg	867
Asp	Glu	Gln	Leu	Thr	Arg	Ala	Glu	Phe	Gln	Arg	Ile	Thr	Gln	Asp	Leu	
270					275					280					285	
ctg	gac	cgc	acc	cgt	cag	ccg	ttc	aag	tcg	gtg	atc	gcc	gac	gcc	ggc	915
Leu	Asp	Arg	Thr	Arg	Gln	Pro	Phe	Lys	Ser	Val	Ile	Ala	Asp	Ala	Gly	
				290					295					300		
atc	tcg	gtg	tcc	gac	atc	gac	cac	gtg	gtg	ctg	gtg	ggc	ggc	tcc	acc	963
Ile	Ser	Val	Ser	Asp	Ile	Asp	His	Val	Val	Leu	Val	Gly	Gly	Ser	Thr	
			305					310				315				
cgg	atg	ccc	gcg	gtg	acc	gac	ctg	gtc	aag	gaa	ctc	acc	ggc	ggc	aag	1011
Arg	Met	Pro	Ala	Val	Thr	Asp	Leu	Val	Lys	Glu	Leu	Thr	Gly	Gly	Lys	
		320					325					330				
gag	ccc	aac	aag	ggc	gtc	aac	ccc	gac	gag	gtt	gtc	gcg	gtg	ggc	gcc	1059
Glu	Pro	Asn	Lys	Gly	Val	Asn	Pro	Asp	Glu	Val	Val	Ala	Val	Gly	Ala	
		335				340					345					
gcc	ctg	cag	gcc	ggc	gtg	ctt	aag	ggc	gag	gtg	aaa	gac	gtt	ctg	ctg	1107
Ala	Leu	Gln	Ala	Gly	Val	Leu	Lys	Gly	Glu	Val	Lys	Asp	Val	Leu	Leu	
350					355					360					365	
ctt	gac	gtt	acg	ccg	ctg	agc	ctg	ggc	atc	gag	acc	aag	ggc	ggc	gtg	1155
Leu	Asp	Val	Thr	Pro	Leu	Ser	Leu	Gly	Ile	Glu	Thr	Lys	Gly	Gly	Val	
				370					375					380		
atg	acc	aag	ctg	atc	gaa	cgc	aac	acc	acc	atc	ccg	acc	aag	cgg	tcc	1203
Met	Thr	Lys	Leu	Ile	Glu	Arg	Asn	Thr	Thr	Ile	Pro	Thr	Lys	Arg	Ser	
			385					390					395			
gag	acg	ttc	acc	acg	gcc	gac	gac	aac	cag	ccg	tcg	gtg	cag	atc	cag	1251
Glu	Thr	Phe	Thr	Thr	Ala	Asp	Asp	Asn	Gln	Pro	Ser	Val	Gln	Ile	Gln	
		400					405					410				
gtg	tat	cag	ggc	gag	cgc	gaa	atc	gcc	gcg	cac	aac	aag	ctg	ctc	ggc	1299
Val	Tyr	Gln	Gly	Glu	Arg	Glu	Ile	Ala	Ala	His	Asn	Lys	Leu	Leu	Gly	
	415					420					425					
tcc	ttc	gag	ctg	acc	gga	att	ccg	ccg	gcg	ccc	cgc	ggc	gtg	ccg	cag	1347
										19						

20

25

30

Ser Arg Thr Thr Pro Ser Ile Val Ala Phe Ala Arg Asn Gly Glu Val
35 40 45

Leu Val Gly Gln Pro Ala Lys Asn Gln Ala Val Thr Asn Val Asp Arg
50 55 60

Thr Ile Arg Ser Val Lys Arg His Met Gly Thr Asp Trp Ser Ile Glu
65 70 75 80

Ile Asp Gly Lys Lys Tyr Thr Ala Gln Glu Ile Ser Ala Arg Val Leu
85 90 95

Met Lys Leu Lys Arg Asp Ala Glu Ala Tyr Leu Gly Glu Asp Ile Thr
100 105 110

Asp Ala Val Ile Thr Val Pro Ala Tyr Phe Asn Asp Ala Gln Arg Gln
115 120 125

Ala Thr Lys Glu Ala Gly Gln Ile Ala Gly Leu Asn Val Leu Arg Ile
130 135 140

Val Asn Glu Pro Thr Ala Ala Ala Leu Ala Tyr Gly Leu Asp Lys Gly
145 150 155 160

Glu Lys Glu Gln Thr Ile Leu Val Phe Asp Leu Gly Gly Gly Thr Phe
165 170 175

Asp Val Ser Leu Leu Glu Ile Gly Glu Gly Val Val Glu Val Arg Ala
180 185 190

Thr Ser Gly Asp Asn Gln Leu Gly Gly Asp Asp Trp Asp Asp Arg Ile
195 200 205

Val Asn Trp Leu Val Asp Lys Phe Lys Gly Thr Ser Gly Ile Asp Leu
210 215 220

Thr Lys Asp Lys Met Ala Met Gln Arg Leu Arg Glu Ala Ala Glu Lys
225 230 235 240

Ala Lys Ile Glu Leu Ser Ser Ser Gln Ser Thr Ser Ile Asn Leu Pro
245 250 255

Tyr Ile Thr Val Asp Ala Asp Lys Asn Pro Leu Phe Leu Asp Glu Gln
260 265 270

Leu Thr Arg Ala Glu Phe Gln Arg Ile Thr Gln Asp Leu Leu Asp Arg
21

275

280

285

Thr Arg Gln Pro Phe Lys Ser Val Ile Ala Asp Ala Gly Ile Ser Val
 290 295 300

Ser Asp Ile Asp His Val Val Leu Val Gly Gly Ser Thr Arg Met Pro
 305 310 315 320

Ala Val Thr Asp Leu Val Lys Glu Leu Thr Gly Gly Lys Glu Pro Asn
 325 330 335

Lys Gly Val Asn Pro Asp Glu Val Val Ala Val Gly Ala Ala Leu Gln
 340 345 350

Ala Gly Val Leu Lys Gly Glu Val Lys Asp Val Leu Leu Leu Asp Val
 355 360 365

Thr Pro Leu Ser Leu Gly Ile Glu Thr Lys Gly Gly Val Met Thr Lys
 370 375 380

Leu Ile Glu Arg Asn Thr Thr Ile Pro Thr Lys Arg Ser Glu Thr Phe
 385 390 395 400

Thr Thr Ala Asp Asp Asn Gln Pro Ser Val Gln Ile Gln Val Tyr Gln
 405 410 415

Gly Glu Arg Glu Ile Ala Ala His Asn Lys Leu Leu Gly Ser Phe Glu
 420 425 430

Leu Thr Gly Ile Pro Pro Ala Pro Arg Gly Val Pro Gln Ile Glu Val
 435 440 445

Thr Phe Asp Ile Asp Ala Asn Gly Ile Val His Val Thr Ala Lys Asp
 450 455 460

Lys Gly Thr Gly Lys Glu Asn Thr Ile Lys Ile Gln Glu Gly Ser Gly
 465 470 475 480

Leu Ser Lys Glu Glu Ile Asp Arg Met Ile Lys Asp Ala Glu Ala His
 485 490 495

Ala Glu Glu Asp Arg Lys Arg Arg Glu Glu Ala Asp Val Arg Asn Gln
 500 505 510

Ala Glu Ser Leu Val Tyr Gln Thr Glu Lys Phe Val Lys Asp Gln Arg
 515 520 525

Glu Ala Glu Gly Gly Ser Lys Val Pro Glu Glu Thr Leu Ser Lys Val
 22

530

535

540

Asp Ala Ala Ile Ala Asp Ala Lys Thr Ala Leu Gly Gly Thr Asp Ile
545 550 555 560

Thr Ala Ile Lys Ser Ala Met Glu Lys Leu Gly Gln Glu Ser Gln Ala
565 570 575

Leu Gly Gln Ala Ile Tyr Glu Ala Thr Gln Ala Glu Ser Ala Gln Ala
580 585 590

Gly Gly Pro Asp Gly Ala Ala Ala Gly Gly Gly Ser Gly Ser Ala Asp
595 600 605

Asp Val Val Asp Ala Glu Val Val Asp Asp Asp Arg Glu Ser Lys
610 615 620

<210> 21
<211> 1701
<212> DNA
<213> Mycobacterium avium

<220>
<221> CDS
<222> (76)..(1701)

<400> 21
gcagcctggt cgtccgtcgc gggcactgca cccggccagg acgtgtcatc cccaatccgg 60

aggaatcact tcgca atg gcc aag aca att gcg tac gac gaa gag gcc cgt 111
Met Ala Lys Thr Ile Ala Tyr Asp Glu Glu Ala Arg
1 5 10

cgc ggc ctc gag cgg ggg ctc aac gcc ctc gcc gac gcg gta aag gtc 159
Arg Gly Leu Glu Arg Gly Leu Asn Ala Leu Ala Asp Ala Val Lys Val
15 20 25

acg ttg ggc ccc aag ggt cgc aac gtc gtc ctg gag aag aag tgg ggt 207
Thr Leu Gly Pro Lys Gly Arg Asn Val Val Leu Glu Lys Lys Trp Gly
30 35 40

gcc ccc acg atc acc aac gat ggt gtg tcc atc gcc aag gag atc gag 255
Ala Pro Thr Ile Thr Asn Asp Gly Val Ser Ile Ala Lys Glu Ile Glu
45 50 55 60

ctg gag gac ccg tac gag aag atc ggc gcc gag ctg gtc aag gaa gtc 303
Leu Glu Asp Pro Tyr Glu Lys Ile Gly Ala Glu Leu Val Lys Glu Val
65 70 75

gcc aag aag acc gac gac gtc gcc ggt gac ggc acg acg acg gcc acg 351
Ala Lys Lys Thr Asp Asp Val Ala Gly Asp Gly Thr Thr Thr Ala Thr
80 85 90

gtg ctc gcc cag gcg ttg gtc cgc gag ggc ctg cgc aac gtc gcg gcc 399
Val Leu Ala Gln Ala Leu Val Arg Glu Gly Leu Arg Asn Val Ala Ala
95 100 105

ggc Gly 110	gcc Ala 110	aac Asn	ccg Pro	ctg Leu	ggt Gly 115	ctc Leu 115	aag Lys	cgc Arg	ggc Gly	atc Ile	gag Glu 120	aag Lys	gcc Ala	gtc Val	gag Glu	447
aag Lys 125	gtc Val	acc Thr	gag Glu	acc Thr	ctg Leu 130	ctc Leu	aag Lys	tcg Ser	gcc Ala	aag Lys 135	gag Glu	gtc Val	gag Glu	acc Thr	aag Lys 140	495
gac Asp	cag Gln	atc Ile	gct Ala	gcc Ala 145	acc Thr	gcg Ala	gcc Ala	atc Ile	tcc Ser 150	gcg Ala	ggc Gly	gac Asp	cag Gln	tcg Ser 155	atc Ile	543
ggc Gly	gac Asp	ctg Leu	atc Ile 160	gcc Ala	gag Glu	gcg Ala	atg Met	gac Asp 165	aag Lys	gtc Val	ggc Gly	aac Asn	gag Glu 170	ggc Gly	gtc Val	591
atc Ile	acc Thr	gtc Val 175	gag Glu	gag Glu	tcc Ser	aac Asn	acc Thr 180	ttc Phe	ggc Gly	ctg Leu	cag Gln	ctc Leu 185	gag Glu	ctc Leu	acc Thr	639
gag Glu	ggt Gly 190	atg Met	cgg Arg	ttc Phe	gac Asp	aag Lys 195	ggt Gly	tac Tyr	atc Ile	tcg Ser	ggc Gly 200	tac Tyr	ttc Phe	gtc Val	acc Thr	687
gac Asp 205	gcc Ala	gag Glu	cgt Arg	cag Gln	gaa Glu 210	gcg Ala	gtc Val	ctc Leu	gag Glu	gac Asp 215	ccg Pro	ttc Phe	atc Ile	ctg Leu	ctg Leu 220	735
gtc Val	agc Ser	tcc Ser	aag Lys	gtc Val 225	tcg Ser	acc Thr	gtc Val	aag Lys	gac Asp 230	ctg Leu	ctg Leu	ccg Pro	ctg Leu	ctg Leu 235	gag Glu	783
aag Lys	gtc Val	atc Ile	cag Gln 240	gcc Ala	ggc Gly	aag Lys	ccg Pro	ctg Leu 245	ctg Leu	atc Ile	atc Ile	gcc Ala	gag Glu 250	gac Asp	gtc Val	831
gag Glu	ggc Gly	gag Glu 255	gcc Ala	ctg Leu	tcc Ser	acc Thr	ctg Leu 260	gtc Val	gtc Val	aac Asn	aag Lys	atc Ile 265	cgc Arg	ggc Gly	acc Thr	879
ttc Phe	aag Lys 270	tcg Ser	gtg Val	gcc Ala	gtc Val	aag Lys 275	gcg Ala	ccc Pro	ggc Gly	ttc Phe	ggc Gly 280	gac Asp	cgc Arg	cgc Arg	aag Lys	927
gcg Ala 285	atg Met	ctt Leu	cag Gln	gac Asp	atg Met 290	gcc Ala	atc Ile	ctc Leu	acc Thr	ggc Gly 295	ggc Gly	cag Gln	gtc Val	atc Ile	agc Ser 300	975
gaa Glu	gag Glu	gtc Val	ggc Gly	ctg Leu 305	tcg Ser	ctg Leu	gag Glu	agc Ser	gcc Ala 310	gac Asp	atc Ile	tcg Ser	ctg Leu	ctc Leu 315	ggt Gly	1023
aag Lys	gcc Ala	cgc Arg	aag Lys 320	gtc Val	gtc Val	gtc Val	acc Thr	aag Lys 325	gac Asp	gag Glu	acc Thr	acc Thr	atc Ile 330	gtc Val	gag Glu	1071
ggc Gly	gcc Ala	ggt Gly 335	gac Asp	tcc Ser	gac Asp	gcc Ala	atc Ile 340	gcc Ala	ggc Gly	cgc Arg	gtg Val	gcc Ala 345	cag Gln	atc Ile	cgc Arg	1119
acc Thr	gag Glu 350	atc Ile	gag Glu	aac Asn	agc Ser	gac Asp 355	tcc Ser	gac Asp	tac Tyr	gac Asp	cgc Arg 360	gag Glu	aag Lys	ctg Leu	cag Gln	1167

gag cgg ctg gcc aag ctg gcc ggc ggc gtg gcg gtg atc aag gcc ggc Glu Arg Leu Ala Lys Leu Ala Gly Gly Val Ala Val Ile Lys Ala Gly 365 370 375 380	1215
gcc gcg acc gag gtc gag ctc aag gag cgc aag cac cgc atc gag gac Ala Ala Thr Glu Val Glu Leu Lys Glu Arg Lys His Arg Ile Glu Asp 385 390 395	1263
gcg gtc cgc aac gcc aag gcg gcc gtg gag gag ggc atc gtc gcc ggc Ala Val Arg Asn Ala Lys Ala Ala Val Glu Glu Gly Ile Val Ala Gly 400 405 410	1311
ggt ggc gtg gcc ctg ctg cac gcg atc ccg gct ctg gac gag ctg aag Gly Gly Val Ala Leu Leu His Ala Ile Pro Ala Leu Asp Glu Leu Lys 415 420 425	1359
ctc gag ggc gaa gag gcg acc ggc gcc aac atc gtc cgg gtg gcc ctc Leu Glu Gly Glu Glu Ala Thr Gly Ala Asn Ile Val Arg Val Ala Leu 430 435 440	1407
gag gct ccg ctg aag cag atc gcc ttc aac ggt ggc ctg gag ccc ggc Glu Ala Pro Leu Lys Gln Ile Ala Phe Asn Gly Gly Leu Glu Pro Gly 445 450 455 460	1455
gtg gtg gcc gag aag gtc cgc aac tcg ccc gcc ggt acc ggc ctc aac Val Val Ala Glu Lys Val Arg Asn Ser Pro Ala Gly Thr Gly Leu Asn 465 470 475	1503
gcc gcc acc ggt gag tac gag gac ctg ctc aag gcc ggc att gcc gac Ala Ala Thr Gly Glu Tyr Glu Asp Leu Leu Lys Ala Gly Ile Ala Asp 480 485 490	1551
ccg gtg aag gtc acc cgc tcg gcg ctg cag aac gcg gcg tcc atc gcg Pro Val Lys Val Thr Arg Ser Ala Leu Gln Asn Ala Ala Ser Ile Ala 495 500 505	1599
ggg ctg ttc ctg acc acc gag gcg gtc gtc gcc gac aag ccg gag aag Gly Leu Phe Leu Thr Thr Glu Ala Val Val Ala Asp Lys Pro Glu Lys 510 515 520	1647
gcg gcc gct ccc gcg ggc gac ccg acc ggc ggc atg ggc ggc atg gac Ala Ala Ala Pro Ala Gly Asp Pro Thr Gly Gly Met Gly Gly Met Asp 525 530 535 540	1695
ttc tga Phe	1701

<210> 22
 <211> 541
 <212> PRT
 <213> Mycobacterium avium

<400> 22

Met Ala Lys Thr Ile Ala Tyr Asp Glu Glu Ala Arg Arg Gly Leu Glu
1 5 10 15

Arg Gly Leu Asn Ala Leu Ala Asp Ala Val Lys Val Thr Leu Gly Pro
20 25 30

Lys Gly Arg Asn Val Val Leu Glu Lys Lys Trp Gly Ala Pro Thr Ile
 35 40 45

Thr Asn Asp Gly Val Ser Ile Ala Lys Glu Ile Glu Leu Glu Asp Pro
 50 55 60

Tyr Glu Lys Ile Gly Ala Glu Leu Val Lys Glu Val Ala Lys Lys Thr
 65 70 75 80

Asp Asp Val Ala Gly Asp Gly Thr Thr Thr Ala Thr Val Leu Ala Gln
 85 90 95

Ala Leu Val Arg Glu Gly Leu Arg Asn Val Ala Ala Gly Ala Asn Pro
 100 105 110

Leu Gly Leu Lys Arg Gly Ile Glu Lys Ala Val Glu Lys Val Thr Glu
 115 120 125

Thr Leu Leu Lys Ser Ala Lys Glu Val Glu Thr Lys Asp Gln Ile Ala
 130 135 140

Ala Thr Ala Ala Ile Ser Ala Gly Asp Gln Ser Ile Gly Asp Leu Ile
 145 150 155 160

Ala Glu Ala Met Asp Lys Val Gly Asn Glu Gly Val Ile Thr Val Glu
 165 170 175

Glu Ser Asn Thr Phe Gly Leu Gln Leu Glu Leu Thr Glu Gly Met Arg
 180 185 190

Phe Asp Lys Gly Tyr Ile Ser Gly Tyr Phe Val Thr Asp Ala Glu Arg
 195 200 205

Gln Glu Ala Val Leu Glu Asp Pro Phe Ile Leu Leu Val Ser Ser Lys
 210 215 220

Val Ser Thr Val Lys Asp Leu Leu Pro Leu Leu Glu Lys Val Ile Gln
 225 230 235 240

Ala Gly Lys Pro Leu Leu Ile Ile Ala Glu Asp Val Glu Gly Glu Ala
 245 250 255

Leu Ser Thr Leu Val Val Asn Lys Ile Arg Gly Thr Phe Lys Ser Val
 260 265 270

Ala Val Lys Ala Pro Gly Phe Gly Asp Arg Arg Lys Ala Met Leu Gln
 275 280 285

Asp Met Ala Ile Leu Thr Gly Gly Gln val Ile Ser Glu Glu val Gly
 290 295 300

Leu Ser Leu Glu Ser Ala Asp Ile Ser Leu Leu Gly Lys Ala Arg Lys
 305 310 315 320

val val val Thr Lys Asp Glu Thr Thr Ile val Glu Gly Ala Gly Asp
 325 330 335

Ser Asp Ala Ile Ala Gly Arg val Ala Gln Ile Arg Thr Glu Ile Glu
 340 345 350

Asn Ser Asp Ser Asp Tyr Asp Arg Glu Lys Leu Gln Glu Arg Leu Ala
 355 360 365

Lys Leu Ala Gly Gly val Ala val Ile Lys Ala Gly Ala Ala Thr Glu
 370 375 380

val Glu Leu Lys Glu Arg Lys His Arg Ile Glu Asp Ala val Arg Asn
 385 390 395 400

Ala Lys Ala Ala val Glu Glu Gly Ile val Ala Gly Gly Gly val Ala
 405 410 415

Leu Leu His Ala Ile Pro Ala Leu Asp Glu Leu Lys Leu Glu Gly Glu
 420 425 430

Glu Ala Thr Gly Ala Asn Ile val Arg val Ala Leu Glu Ala Pro Leu
 435 440 445

Lys Gln Ile Ala Phe Asn Gly Gly Leu Glu Pro Gly val val Ala Glu
 450 455 460

Lys val Arg Asn Ser Pro Ala Gly Thr Gly Leu Asn Ala Ala Thr Gly
 465 470 475 480

Glu Tyr Glu Asp Leu Leu Lys Ala Gly Ile Ala Asp Pro val Lys val
 485 490 495

Thr Arg Ser Ala Leu Gln Asn Ala Ala Ser Ile Ala Gly Leu Phe Leu
 500 505 510

Thr Thr Glu Ala val val Ala Asp Lys Pro Glu Lys Ala Ala Ala Pro
 515 520 525

Ala Gly Asp Pro Thr Gly Gly Met Gly Gly Met Asp Phe
 530 535 540